COMPARATIVE ANALYSIS OF VITAMIN D CONTENT IN POPULATION OF DIFFERENT CLIMATIC ZONES OF CARPATHIAN REGION

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Abstract. The adequate vitamin D intake is found only in 19,5 % of inspected habitants of Carpathian region. The vitamin D deficiency is marked in 135 (80,5 %) and among them severe form is detected in 48 (28,4 %) of the inspected people. Frequency of vitamin D deficiency depends on a residence and increases with the height above a sea level. 25 (OH) D level is higher among the ihabitants of low altitude region (27,14±1,26 nmol/l) comparatively with data of middle altitude region (21,37±1,34 nmol/l) and high altitude region (15,56±1,04 nmol/l).

Key words: vitamin D, Carpathian region.

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Buk. Med. Herald. – 2014. – Vol. 18, № 4 (72). – P. 113-116

Надійшла до редакції 16.09.2014 року

UDC 616.12-008.1-053-073.7-02:616.36-003.826-06

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AGE-DEPENDENT PECULIARITIES OF ECHOCARDIOGRAPHIC PARAMETERS OF THE HEART IN PATIENTS WITH NONALCOHOLIC FATTY LIVER DISEASE

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Abstract. In present study echocardiographic features of the cardiovascular system in patients with nonalcoholic fatty liver disease (NAFLD) of different ages were examined. Structural and functional parameters of the heart change in nonalcoholic fatty liver patients with age: a progressive increase in the size of the left atrium, right ventricle, and decrease of ejection fraction. In young patients the formation of concentric remodeling and eccentric hypertrophy, in elderly patients – development of its concentric hypertrophy was observed. The above-mentioned requires timely use of cardio-protective drugs in the treatment of these patients.

Key words: nonalcoholic fatty liver disease, myocardial remodeling, echocardiography.

Introduction. Recently various researchers pay attention to the role of NAFLD in the development and progression of alterations in the cardiovascular system. Numerous epidemiological studies suggest an increased incidence of adverse cardiovascular events in patients with NAFLD as compared with the general population [2, 8, 11]. E. Ruttmann et al. studies for 12-year follow-up demonstrated a significant relationship between increased activity of gamma-glutamyltransferase in NAFLD patients and cardiovascular mortality, even after adjustment of typical cardiovascular risk factors and normalization of body mass index [3]. S. Treeprasertsuketal showed that patients with NAFLD have a higher 10-year risk of coronary heart disease than an average person in general population of the same age and gender [10].

Indicators of central hemodynamics in NAFLD patients are characterized by increase of systolic and diastolic blood pressure, heart rate, total peripheral vascular resistance and cardiac output[4, 5]. In response to hemodynamic changes structural changes in the left ventricle occur, including its hypertrophy, fibrosis of the stroma and dilatation of the heart cavities. The afore-mentioned facts are proved by increase of the intra-ventricular septum, left ventricular posterior wall thickness and left ventricular myocardial mass index [6].

The **objective** of our study was to examine echocardiographic features of the cardiovascular system in patients with NAFLD of different ages.

Materials and methods. To find possible differences in the functional and structural parameters of the heart echocardiographic study of 54 patients with NAFLD was conducted. All patients and healthy individuals were divided by age factor adopted by the European Regional Office of the WHO life periods classification (1963). According to this classification, three groups were determined: 15 patients aged from 20 to 44 years (group I), 22 patients aged 45 - 59 years (group II) and 17 patients aged from 60 to 74 years (III group). Among the examined patients there were 29 males, and 25 females. The disease duration ranged from 1 to 5 years. The control group consisted of 30 healthy individuals, which was divided according to the above-mentioned classification into three subgroups – per

Table 1

Echocardiographic parameters of the patients with non-alcoholic fatty liver disease and healthy people of different ages (M±m, n, p)

Parameters	Healthy volunteers (age 20-44 years, n=10)	Healthy volunteers (age 45-59 years, n=10)	Healthy volunteers (age 60-74 years, n=10)	Patients with NAFLD (age 20-44 years, n=15)	Patients with NAFLD (age 45-59 years, n=22)	Patients with NAFLD (age 60-74 years, n=17)
Left atrium diameter	3,65±0,08	3,92±0,15	4,05±0,10	4,16±0,11*	4,31±0,09*/****	4,32±0,11*/****
Right vertical diameter	2,01±0,05	2,10±0,08	2,15±0,07	2,24±0,05*	2,55±0,07*/***	2,52±0,08*/***
End diastolic left ventricular size	5,21±0,11	5,15±0,12	5,22±0,15	5,29±0,15	5,53±0,20*	5,39±0,17
End systolic left ventricle size	3,21±0,10	3,25±0,12	3,35±0,19	3,51±0,11*	3,83±0,21*/****	3,62±0,15*
Ejection fraction	63,95±2,10	63,21±1,52	61,78±1,43	59,67±1,23*	58,56±1,15*	58,67±1,32**
Left ventricular myocardial mass (mg)	221,32±12,54	227,34±11,25	243,23±15,57	257,33±14,32*	293,83±14,52*/****	309,02±18,54*/***
Left ventricular myocardial mass index (mg/m²)	107,24±7,38	115,78±9,21	127,24±9,56	121,17±8,23*	137,38±9,38*/***	159,45±10,23*/***

Note. * – difference is significant as compared with the group of healthy volunteers of proper age (p<0,01); ** – difference is significant as compared with the group of healthy volunteers of proper age (p<0,05); *** – difference is significant as compared with the 1st group of patients with NAFLD (p<0,01); **** – difference is significant as compared with the 1st group of patients with NAFLD (p<0,05)

10 people each. Before the examination, all patients and healthy volunteers gave written informed agreement.

Echocardiographic studies were performed using the ultrasound diagnostic system "En Visor HDS" firm Philips Ultrasound System (USA) with determination of structural and functional parameters by Asmi MN, Walsh MJ method [1]. Left ventricular myocardial mass (LVMM) was determined by R. Devereux and N. Reichek formula modified by the American Society of Echocardiography [7].

The left ventricular myocardial mass index (LVMMI) was calculated by the formula:

$$LVMMI\ (g/m^2) = LVMM / BSA,$$

where BSA is body surface area (m²).

Left ventricular hypertrophy was diagnosed by the Guidelines for the management of Arterial Hypertension (2007) [7]. According to this recommendations left ventricular hypertrophy consider increasing LVMMI for men > 125 g/m², for women > 110 g/m².

The relative left ventricle wall thickness (RWT) was calculated by the formula:

$$RWT = (2 * \text{ventricle posterior wall thickness in diastole}) / EDV$$

To evaluate the type of left ventricular remodeling A. Ganau et al. classification was used [9].

Statistical analysis of the data was performed to determine the type of data distribution by comparing the arithmetic mean, mode and median and by means of Wilcoxon test. To determine statistical differences between two independent groups Mann-Whitney test was used, and between three or more independent groups – Kruskal-Wallis tests was used.

Results. In patients with NAFLD increase in the sizes of the heart chambers, beginning from a young age was found. The left atrium diameter in patients of the 1st group prevailed to 14,0 % (p<0,01) as compared with the corresponding control group. A similar pattern was observed in other age groups: in the 2nd group left atrium diameter was 9,9 % (p<0,05) and in the 3rd group – 6,7 % (p<0,05) higher as compared with those in the corresponding control groups. With age, the size of the left atrium in the observed patients also significantly increased (Table 1).

In all age groups of patients with NAFLD a significant increase in the right ventricle size as compared with the same in healthy volunteers was found: 11,4 % (p<0,01) – in the young patients, 21,4 % (p<0,01) – in the mature patients and 17,2 % (p<0,01) – in the elderly patients. Reducing the difference in the elderly is associated primarily with an increase in size of the right ventricle in healthy individuals. Patients of the 2nd and 3rd groups were significantly greater relative to similar parameters in the 1st experimental group in 13,8 % (p<0,01) and 12,5 % (p<0,01) respectively.

End systolic left ventricle size in patients with NAFLD of all age groups was significantly higher as compared with practically healthy people. In particular, patients of the 1st experimental group showed an increase of this parameter in 9,3 % (p<0,01), of the

2nd experimental group – in 17,8 % (p<0,01), of the 3rd experimental group – in 8,1 % (p<0,01). End diastolic left ventricular size was significantly higher in the examined patients as compared with healthy volunteers only in the adult patients, it prevailed 7,8 % (p<0,01) appropriate benchmarks (Table 1).

Ejection fraction in the examined patients was reduced in all age groups. In the 1st, 2nd and 3rd groups examined ejection fraction was significantly lower (p<0,05) by 7,2 %, 7,9 % and 5,3 % as compared with the corresponding control values (Table 1).

LVMM increased in patients with NAFLD as compared with healthy volunteers of appropriate age, and achieves maximal values in the elderly group. In patients of the 1st experimental group LVMM was 16,7 % (p<0,01) higher comparing with the respective group of healthy people. Patients of the 2nd and 3rd experimental groups showed the prevalence in this parameter on 29,2 % (p<0,01) and 27,0 % (p<0,01) respectively. LVMM in patients of the 2nd and 3rd groups was higher by 14,2 % (p<0,05) and 20,1 % (p<0,01) respectively, as compared with the patients of the1st group (Table 1).

A similar tendency was noted for LVMMI, which increased with age of the observed patients. In NAFLD patients of the 2nd group LVMMI was on 13,4 % (p<0,01), while in the 3rd group of patients - already on 31,6 % (p <0,01) higher than in the patients of the 1st experimental group. It should be noted that an average LVMMI in adult and elderly patients were generally higher than standard rates [7]. LVMMI was the highest in elderly patients and pointed the rates of 159,45±10,23 g/m^2. In healthy people LVMMI also increased with age, but this enlargement was slower and lower as compared with NAFLD patients (Table 1).

Left ventricular geometry type was determined on the basis of LVMMI and relative thickness of left ventricle walls comparison. The normal geometric structure of the left ventricular myocardium was observed in almost half of the patients in the first group. In $^1/_3$ of the patients in this group eccentric hypertrophy was found, and in three patients – concentric hypertrophy. In the second experimental group patients with eccentric hypertrophy of the myocardium dominated, which accounted for $^1/_2$ of the general quantity of the patients in this group. The number of patients with concentric remodeling and concentric hypertrophy accounted for about $^1/_5$ of the total population of each. Only two patients in the second group showed normal geometric structure of the myocardium. In the third experimental group the number of patients with concentric hypertrophy of the myocardium significantly increased which accounted for more than $^2/_3$ of the total number of patients in this group. Three patients in this group were diagnosed to have concentric remodeling of the myocardium, two – eccentric left ventricular hypertrophy. Persons with normal left ventricular geometry in the third experimental group were not found.

Conclusions

Structural and functional parameters of the heart change in nonalcoholic fatty liver patients with age: a progressive increase in the size of the left atrium, right ventricle, and decrease of ejection fraction. In young patients the formation of concentric remodeling and eccentric hypertrophy, in elderly patients – development of its concentric hypertrophy was observed. The above-mentioned requires timely use of cardio-protective drugs in the treatment of these patients.

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ВОЗРАСТНЫЕ ОСОБЕННОСТИ ЭХОКАРДИОГРАФИЧЕСКИХ ПАРАМЕТРОВ СЕРДЦА У БОЛЬНЫХ С НЕАЛКОГОЛЬНОЙ ЖИРОВОЙ БОЛЕЗНЬЮ ПЕЧЕНИ

В.П. Присяжнюк

Резюме. Исследованы возрастные изменения эхокардиографических параметров у больных неалкогольной жировой болезнью печени. В обследованных пациентов с возрастом наблюдается изменение структурных и функциональных параметров сердца: прогрессирующее увеличение размеров левого предсердия, правого желудочка, снижение фракции выброса. В них также изменяется геометрия миокарда левого желудочка, в молодом и зрелом возрасте проявляется формированием концентрического ремоделирования и эксцентрической гипертрофии, а у больных пожилого возраста – развитием его концентрической гипертрофии. Указанное требует своевременного применения кардиопротекторных средств в комплексном лечении этого контингента больных.

Ключевые слова: неалкогольная жировая болезнь печени, ремоделирования миокарда, эхокардиография.

ВІКОВІ ОСОБЛИВОСТІ ЕХОКАРДІОГРАФІЧНИХ ПАРАМЕТРІВ СЕРЦЯ У ХВОРИХ НА НЕАЛКОГОЛЬНУ ЖИРОВУ ХВОРОБУ ПЕЧІНКИ

В.П. Присяжнюк

Резюме. Досліджено вікові зміни ехокардіографічних параметрів у хворих на неалкогольну жирову хворобу печінки. В обстежених пацієнтів із віком спостерігається зміна структурних та функціональних параметрів серця: прогресуюче збільшення розмірів лівого передсердя, правого шлуночка, зниження фракції викиду. У них також змінюється геометрія міокарда лівого шлуночка, що в молодому та зрілому віці проявляється формуванням концентричного ремоделювання та ексцентричної гіпертрофії, а у хворих літнього віку – розвитком його концентричної гіпертрофії. Зазначене вимагає своєчасного застосування кардіопротекторних засобів у комплексному лікуванні цього контингенту хворих.

Ключові слова: неалкогольна жирова хвороба печінки, ремоделювання міокарда, ехокардіографія.

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Buk. Med. Herald. – 2014. – Vol. 18, № 4 (72). – P. 116-119

Надійшла до редакції 27.10.2014 року

УДК616.12-008.331-06:616-056.52]-036:616.12-008.318:612.018:577.175.7]-07

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ЛЕПТИНЕМІЯ ТА ПОКАЗНИКИ ВАРІАБЕЛЬНОСТІ РИТМУ СЕРЦЯ І ПРОГНОЗ У ХВОРИХ НА ГІПЕРТОНІЧНУ ХВОРОБУ З ОЖИРІННЯМ

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Резюме. Обстеження 103 хворих на гіпертонічну хворобу з ожирінням виявило залежність від вмісту лептину (гіпер-, нормо- чи гіполептинемія) особливостей автономної кардіорегуляції, електричної систоли шлуночків та прогнозу несприятливих кардіоваскулярних подій.

Ключові слова: лептин, гіпертонічна хвороба, варіабельність ритму серця.

Вступ. Жирова тканина продукує адипокіни, до яких відноситься лептин (Л). Описано, що гіперлептинемія у пацієнтів за умов артеріальної гіпертензії (АГ) асоціюється зі збільшенням індексу маси тіла (ІМТ), окружності талії, систолічного (САТ) та діастолічного (ДАТ) артеріального тиску, інсуліну та інсулінорезистентністю [1]. У пацієнтів з низьким рівнем Л була дисліпідемія, вищі показники системного запалення та дисфункції ендотелію [5]. Однак проблемі впливу адипокінів на показники електричної стабільності міокарда присвячені лише окремі роботи. Виявлений зв'язок екстрасистолії з рівнями Л, ліпідів, маркерів запалення в осіб з діабетичною кардіоміопатію з ожирінням (ОЖ) [2]. У жінок з ОЖ дослідження варіабельності ритму серця (ВРС) встановило обернені кореляції між низькочастотним компонентом спектра Low Frequency (LF) та Л, коефіцієнтом симпато-парасимпатичного балансу LF/High Frequency (HF) та ДАТ, тоді як показники парасимпатичного впливу кореляцій не мали [9], показники ВРС були знижені та пов'язані з ренін-ангіотензиновою системою [4]. Однак вісцеральна жирова маса обернено корелювала з показниками сумарної ВРС, а також високочастотної і низькочастотної її складових [6]. Описано